CHAPTER 1

INTRODUCTION

1.1 Background of Problem

In many cases, clay deposit layers which are widely distributed over the seaside show various aspects according to the type of base rock or distribution characteristics. Especially very soft ground composed of marine clayey deposit which is mostly distributed over the west and south east coast part of Malaysia, is considerably affected by the numerous factors such as components of the deposit, particle size distribution, the shape of the particles, properties of the absorbed ion and pore water, tidal current, temperature and so on (Yoon *et al*, 2006). Figure 1.1 shows the general location of the deposits. Moreover, after the deposit process, geotechnical characteristics of the ground show great complexity by its history, the variation of pore water, leaching process, gas generation and many more.

Recently in Malaysia, the increasing attention on coastal development projects have gained momentum as it is expected for the utilization of the soft ground to be increased hereafter. Therefore, technical backgrounds for the effective utilization of soft ground are to be highly demanded. For these reasons, as a fundamental stage, the collected data have been analyzed to establish various correlation and design parameters. The locations of the project sites considered are superimposed on Figure 1.1 and Figure 1.2.

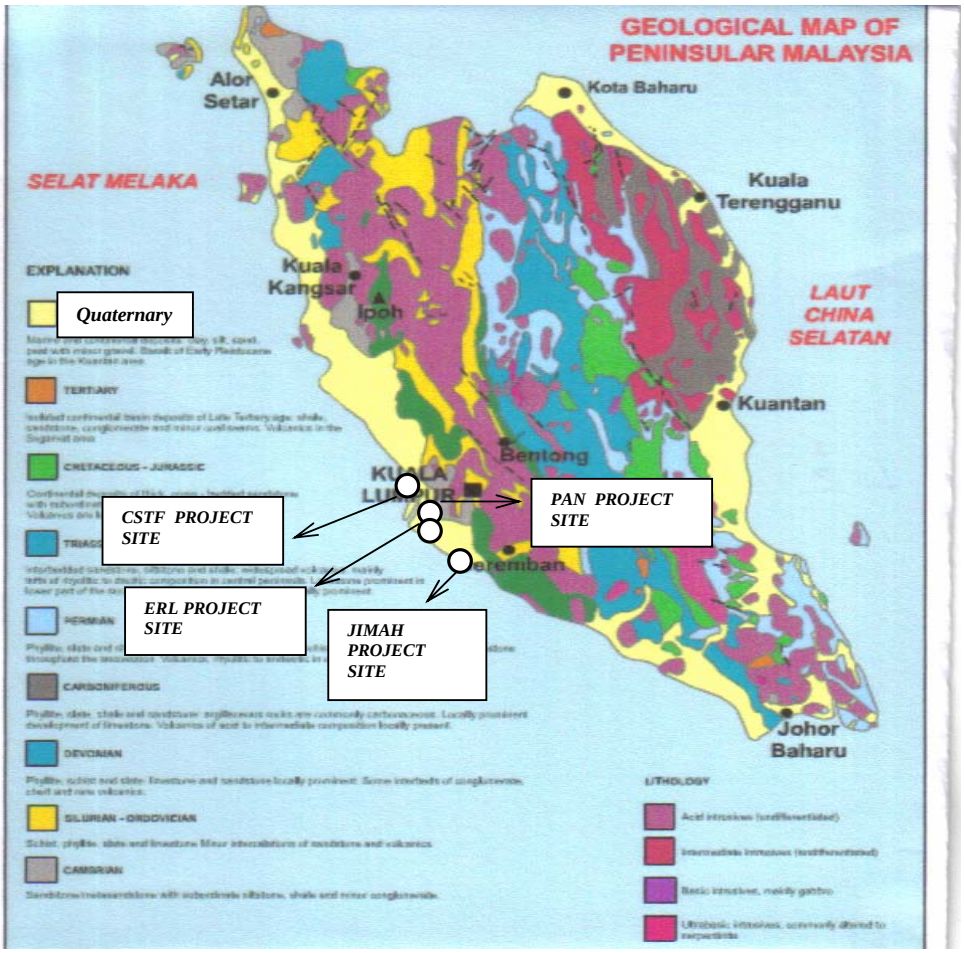

Figure 1.1 Quaternary deposits at Peninsular Malaysia and the locations of the site (Geological Map of Peninsular Malaysia, 8th Edition, 1985)

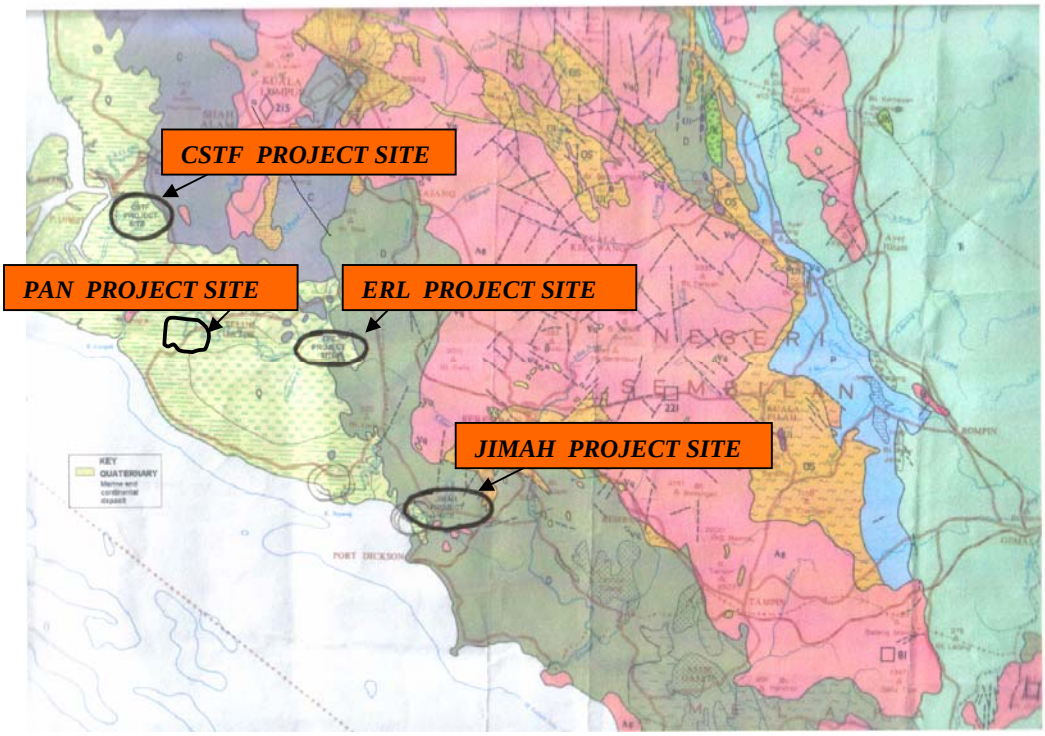

Figure 1.2 Project site locations: Central Sludge Treatment Facility (CSTF) in South Klang Valley, Express Rail Link (ERL) in Sungai Labu Sepang, Jimah Power Station (JIMAH) in Port Dickson and Pusat Angkasa Negara in Mukim Kelanang, Daerah Kuala Langat.

1.2 Statement of Problem

The solutions of many geotechnical issues on construction are very much directly or indirectly related to the understanding of the problematic soil. Marine clay is one of the problematic soils which are commonly found along the coastal area of west Malaysia. Thus, it is very important to understand the characteristic and behaviour of marine clays. However, in many situations geotechnical engineers are often expected to provide prediction of the subsoil behaviour during and after construction. To provide a satisfactory prediction, geological knowledge and

understanding of subsoil are essential in order to use the reliable correlations developed by the researcher based on the existing data.

This master project attempts to compile information's obtained from site investigation works for better understanding of the marine clay properties of this area. In addition, as geotechnical engineers are often expected to provide their estimation of soil behaviour even when there is no relevant test results are available, this master project attempts to develop empirical correlations for estimating the engineering characteristic of shear strength properties. Such correlations included undrained shear strength (S_u), cohesion (c) and clay effective soil friction angle (ϕ') with basic properties and compressibility parameters. Compressibility parameters are equally important in the design of land reclamation and building structures on soft clay, therefore some of the compression parameters are also correlated, such as compression index (C_c), coefficient of volume compressibility (m_v), void ratio (e_o) and compression ratio (CR) with basic properties.

1.3 Aim and Objective of the Study

The aim of the study is to develop correlations between engineering characteristics of marine clay taken from central west coast of Malaysia. In order to achieve the aim of study, three objectives have been identified:

(i) To determine the characteristic of marine clay in particular the basic properties, strength and compressive characteristics.

(ii) To obtain the correlations between strength with basic properties and compressibility parameters of marine clay.

(iii) To obtain the correlations between compressibility parameters and basic parameters of marine clay.

1.4 Scope of Study

The study are conducted based on data collection from three construction sites, which are Central Sludge Treatment Facility (CSTF) in South Klang Valley, Jimah Power Station (JIMAH) in Port Dickson and Express Rail Link (ERL) in Sungai Labu Sepang. This covers only the central west coast of Malaysia.

Site and laboratory tests had not been carried out thus, all the soil information and test results were obtained from the existing soil investigation that have been done by contractors and commercial laboratories.

The correlations reviewed and analysed in this study are limited to shear strength and compressibility parameters, such as undrained shear strength (S_u), effective frictional angle (ϕ'), compression index (C_c), coefficient of volume compressibility (m_v), void ratio (e_o) and compression ratio (CR).

1.5 Importance of Study

Basic knowledge and understanding of geotechnical properties of marine clay is very important due to many projects are developed along the coastal area, where this will overcome the problems related to settlement and also the stability.

Correlations obtained not only will be used at the study area but also at other places with similar soil condition. This will allow the engineers to use the correlations obtained for design purposes without having to do strength or compressibility tests, hence will be able to save cost and also to reduce the time.